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The Indochina Entomologist
OPEN ACCESS
New Taxon
ICE, 1 (72): 723–730 (2025)
ISSN (Online) 3065-1107
www.indochinaentomologist.com

https://doi.org/10.70590/ice.2025.01.72
http://zoobank.org/urn:lsid:zoobank.org:pub:CE47A9B3-F0F6-4690-B7B0-662B21DC97B6

Uncovering urban biodiversity: A remarkable new species of *Mongolabis* from Nanjing City, China (Dermaptera: Anisolabididae)

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Abstract: The earwig family Anisolabididae (Dermaptera) remains taxonomically challenging due to the generic boundaries being largely defined by overlapping characters derived from male genital morphology. During a faunal survey conducted in the Qixia Mountain Scenic Area in Nanjing City, Jiangsu Province, China, a remarkable new species referable to genus *Mongolabis* Zacher, 1911 was discovered. The new species, *Mongolabis qixiashana* **sp. nov.**, is distinguished by its unique male genital structure bearing a distinct rounded process within the groove between the dorsal and ventral membranes of the external parameres, which is an autapomorphic feature not found in any of its congeners or related genera. Although its overall paramere proportions and margins resemble those of *Mongolabis*, the generic placement of the new species is considered tentative pending a comprehensive phylogenetic reassessment of the family. This finding highlights the persistence of hidden earwig diversity within highly urbanized environments and underscores the need for an integrative revision of Anisolabididae combining morphology and molecular data.

Keywords: Genitalia, morphology, Qixia Mountain, taxonomy, urban biodiversity

发达城市中隐藏的生物多样性：中国南京市芒肥螋属一新种记述（革翅目：肥螋科）

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摘要：肥螋科（革翅目）的分类学研究长期以来颇具挑战，这主要源于其属级鉴定特征（尤其雄性生殖器形态）存在大量重叠。在对中国江苏省南京市栖霞山风景区的动物区系调查中，作者发现了一种隶属于芒肥螋属（中文名新拟）的显著新物种，栖霞山芒肥螋 *Mongolabis qixiashana* **sp. nov.**。该新种的独特之处在于其雄性生殖器结构：阳茎基侧突的背膜与腹膜之间的沟槽内，具一明显的圆形突起。此特征为该物种的独有衍征，未见于同属其他物种或近缘属中。根据雄性生殖器基侧突的比例与边缘特征，作者暂将此新种归入芒肥螋属。本发现揭示了在高度发达的城市环境中仍存在隐藏的生物多样性，并强调了结合形态学与分子证据对肥螋科进行整合分类学修订的必要性。

关键词：生殖器；形态学；栖霞山；分类学；城市生物多样性

Citation: Chen Z-T 2025: Uncovering urban biodiversity: A remarkable new species of *Mongolabis* from Nanjing City, China (Dermaptera: Anisolabididae). *The Indochina Entomologist*, 1 (72): 723–730. [陈志腾 2025: 发达城市中隐藏的生物多样性：中国南京市芒肥螋属一新种记述（革翅目：肥螋科）. 中南半岛昆虫学家, 1 (72): 723–730.]
https://doi.org/10.70590/ice.2025.01.72

Accepted by Cheng-Bin WANG: 23.X.2025; published online: 28.X.2025

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Introduction

The family Anisolabididae is a species-rich group of earwigs. Members of this family are typically characterized by a robust body, a cylindrical second tarsal segment, and reduced or absent wings. Males possess strongly asymmetrical forceps, with one branch more markedly curved than the other. The generic classification of Anisolabididae remains problematic because it relies almost exclusively on the shape and proportions of the external parameres of the male genitalia. This narrow diagnostic basis has led to continual changes in the generic placement of numerous species (Steinmann 1989; Srivastava 1999; Chen & Ma 2004; Kočárek 2014; Nishikawa & Jaitrong 2023). Among the genera with obscure boundaries, *Euborellia* Burr, 1909, *Anisolabella* Zacher, 1911, *Mongolabis* Zacher, 1911, and *Gonolabis* Burr, 1900 are frequently confused due to their external parameres exhibit transitional morphologies: approximately 1–1.5 times longer than wide in *Euborellia*, 1.5 times longer than wide in *Anisolabella* and *Mongolabis*, and 2–2.5 times longer than wide in *Gonolabis*.

The generic attribution of species in previous studies is often inconsistent, even within the same work. For example, Srivastava (2003a) and Nishikawa & Jaitrong (2023) listed *Mongolabis vallakadaiensis* (Ramamurthi & David, 1973) in *Mongolabis* despite its external parameres being at least 2.5 times longer than wide. Likewise, *Mongolabis emarginata* Srivastava, 2003 (Srivastava 2003b) was also placed in *Mongolabis* although its external parameres are at least twice as long as wide (Nishikawa & Jaitrong 2023). Numerous other examples of such inconsistencies exist. Consequently, the generic system of Anisolabididae requires comprehensive revision, particularly through molecular analyses. Descriptions of new taxa should therefore rely on clearly distinctive morphological features.

During a recent survey of the Qixia Mountain Scenic Area in Nanjing, Jiangsu Province, China, I collected several specimens of Anisolabididae. The males exhibit a unique genital structure with a distinct process located in the groove between the dorsal and ventral membranes of the external parameres. This peculiar morphology renders the generic assignment of the species challenging. The species appears related to *Anisolabella*, *Euborellia*, *Gonolabis*, and *Mongolabis*, and could arguably warrant a separate genus. However, to maintain taxonomic rigor and avoid proliferation of monotypic genera based on single species, I tentatively assign it to *Mongolabis*, following the criteria of Srivastava (1999, 2003a) and Nishikawa & Jaitrong (2023), who defined the genus by external parameres approximately 1.5 times longer than wide and with angled outer margins. The discovery of this remarkable new species underscores that even highly developed urban areas can harbor previously unknown elements of biodiversity.

Material and methods

The specimens were hand-collected from beneath rocks (Fig. 1A, B) and preserved in 75% ethanol. The type specimens are deposited in the Insect Collection of Jiangsu University of Science and Technology (ICJUST), Jiangsu Province, China. Morphological examinations and identifications were conducted using an SDPTOP SZM45 stereomicroscope. Images were captured with a Canon EOS 5DSR camera with a Canon MP-E 2.8/65 mm macro lens. Figure plates were prepared in Adobe Photoshop 2025.

Body length was measured from the anterior margin of the head to the posterior tip of the forceps, and the forceps length from the visible lateral base to the apex. Morphological terminology follows Steinmann (1989), and the order of description follows Nishikawa (2021).

Zacher (1911) did not provide an explicit etymology for *Mongolabis*, and no previous publication has proposed a Chinese vernacular name for the genus. Therefore, a new Chinese name is here proposed, derived from its pronunciation, as no unique morphological character defines the genus.

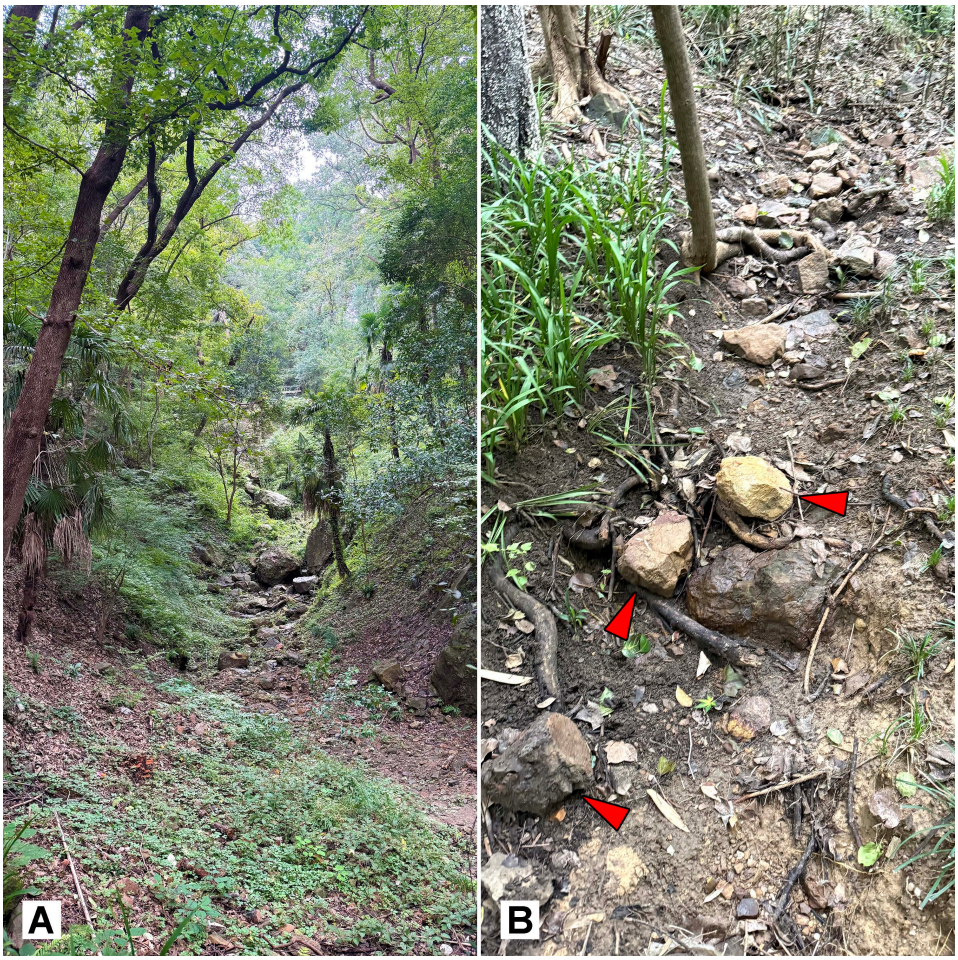

FIGURE 1. *Mongolabis qixiashana* **sp. nov.**: **A** general habitat in Qixia Mountain **B** specific collecting sites. Red arrowheads indicate specimens collected from beneath rocks.

Taxonomy

Family Anisolabididae Verhoeff, 1902
Genus *Mongolabis* Zacher, 1911

Mongolabis qixiashana sp. nov. 栖霞山芒肥螋

https://zoobank.org/BE81D2FF-6DA5-475E-927F-2266305C5BB1

Figs 1–5

Type material. Holotype: ♂ (ICJUST): **CHINA:** Jiangsu Province, Nanjing, Qixia Mountain Scenic Area (Fig. 1A, B), 32.1514°N, 118.9632°E, 100 m, 2-X-2025, Zhi-Teng Chen. **Paratypes:** 3♂♂4♀♀ (ICJUST), same data as holotype.

Etymology. The specific epithet refers to the type locality, Qixiashan (Qixia Mountain).

Description. ***Male.*** Body length with forceps ca. 17.5 mm. Forceps length ca. 2.5 mm.

Color (Fig. 2A–C). Body mostly dark brown. Antennae with two to three pale subapical segments. Thorax and abdominal tergites mostly dark brown; pronotum with brownish lateral margins. Thoracic sterna and abdominal sternites brown. Legs with basal halves of femora dark, tibiae mostly dark brown, remaining parts yellow. Forceps dark basally, reddish brown apically.

Head (Fig. 2A–C). Surface punctured, longer than broad; posterior margin slightly emarginate. Frons weakly convex; frontal and coronal sutures distinct. Eyes small, slightly shorter than post-ocular region. Antennae at least 17-segmented; 1st segment stout, nearly two-thirds of distance between antennal bases, slightly expanded apically;

2nd small, about as long as broad; 3rd cylindrical, about twice as long as 4th; subsequent segments gradually elongated except apical segments; segments from 4th onward claviform.

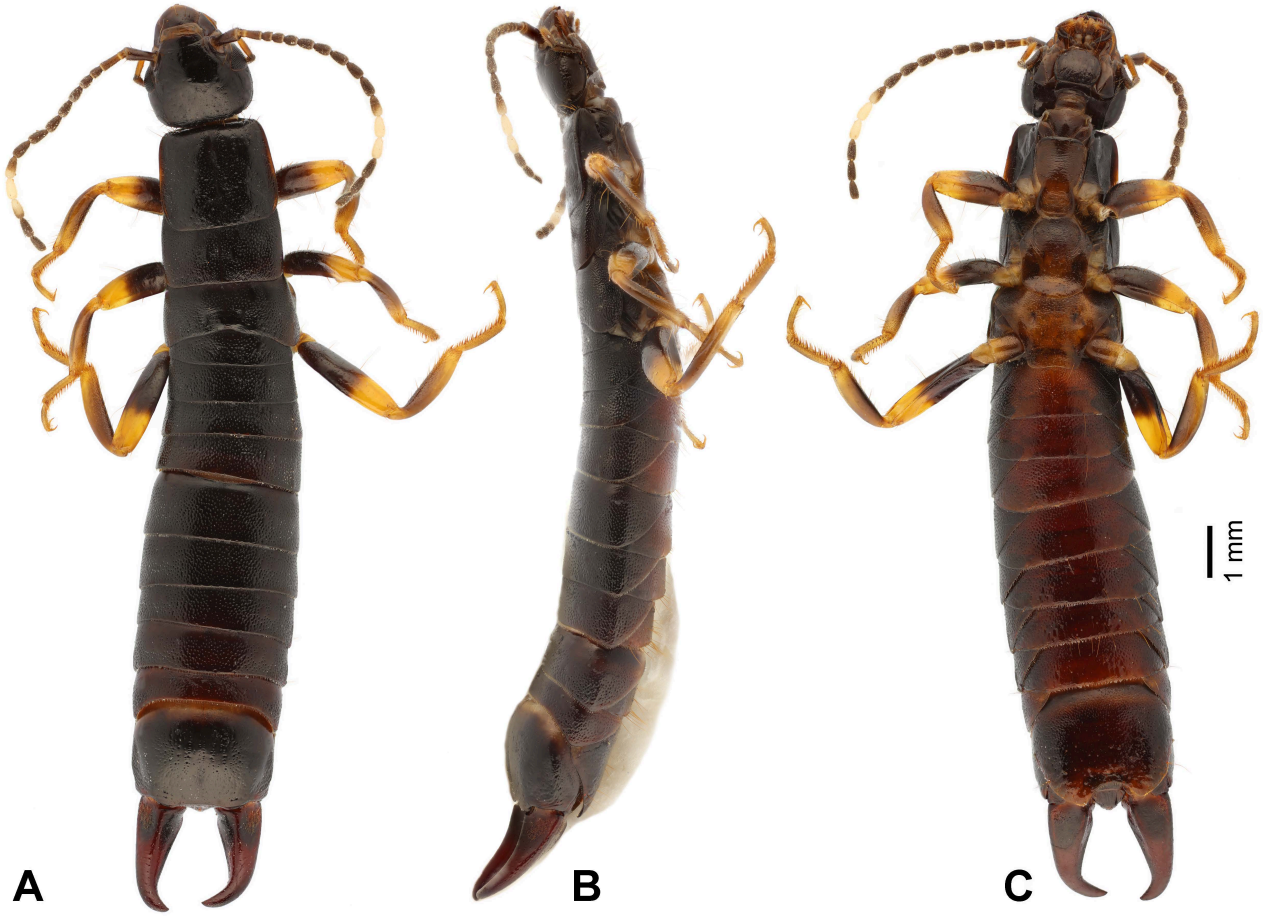

FIGURE 2. *Mongolabis qixiashana* **sp. nov.**, male holotype: **A** habitus, dorsal view **B** habitus, lateral view **C** habitus, ventral view.

Thorax (Fig. 2A–C). Pronotum densely punctured, transverse, about 1.1 times broader than long, slightly broader than head, posteriorly expanded; anterior and lateral margins gently rounded; posterior margin nearly truncate; all angles rounded; prozona weakly convex, metazona weakly depressed; median sulcus obscure. Apterous. Meso- and metanotum transverse, slightly wider than pronotum, densely punctured; mesonotum almost truncate posteriorly, metanotum distinctly emarginate. Prosternum about twice as long as broad, constricted between fore coxae, posterior margin nearly truncate; mesosternum longer than broad, posterior margin rounded; metasternum transverse, narrowed between hind coxae, posterior margin emarginate. Legs short and stout; hind tarsi with 1st segment about 1.4 times as long as 3rd.

Abdomen (Figs. 2–3). Slightly widened medially, weakly depressed, densely punctured; posterolateral angles of segments obtuse, ecarinate. Ultimate tergite transverse, slightly narrowed posteriorly; median sulcus invisible; posterior margin concave medially, oblique and concave laterally. Penultimate sternite transverse, broadly rounded, with a deep, wide posteromedial notch about three times wider than long. Pygidium subtriangular, about 1.5 times as wide as long, with obtuse angles. Forceps asymmetrical; right branch more incurved subapically than left; branches remote at base, each trigonal basally with an obtuse dorsal ridge, tapering gradually toward apex; inner margin finely denticulate.

Genitalia (Fig. 4A–C). Entire structure slender. Paramere broad, lateral margins rounded; anterior margin with a deep median longitudinal incision. External parameres about half as long as the anteromedial incision of the

paramere, 1.5 times as long as wide, widest medially; outer margin angled, apex obtuse; inner groove between dorsal and ventral membranes bearing a small rounded process at apical one-third. Genital lobe with one small subapical and one broad apical spinule pad. Virga within genital lobe invisible.

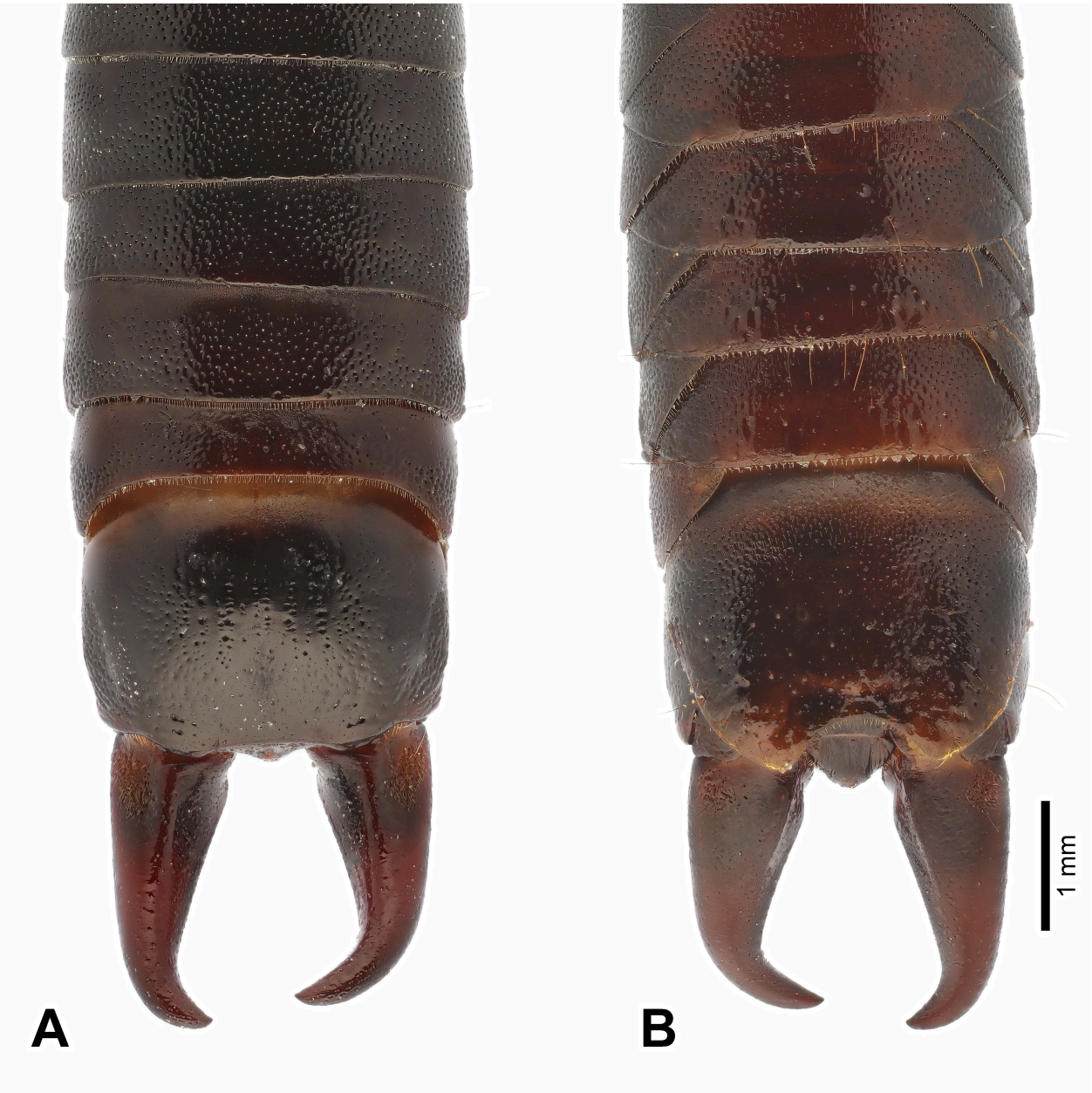

FIGURE 3. *Mongolabis qixiashana* **sp. nov.**, male holotype: **A** terminalia, dorsal view **B** terminalia, ventral view.

Female. Body length with forceps ca. 18.5 mm; forceps ca. 2.5 mm. Color pattern generally similar to male (Fig. 5A–C). Pronotum and ultimate tergite nearly smooth. Penultimate sternite simple, posterior margin rounded. Pygidium subtrapezoidal, about as long as wide, with emarginate posterolateral and posteromedian margins. Forceps symmetrical, similar in shape to male.

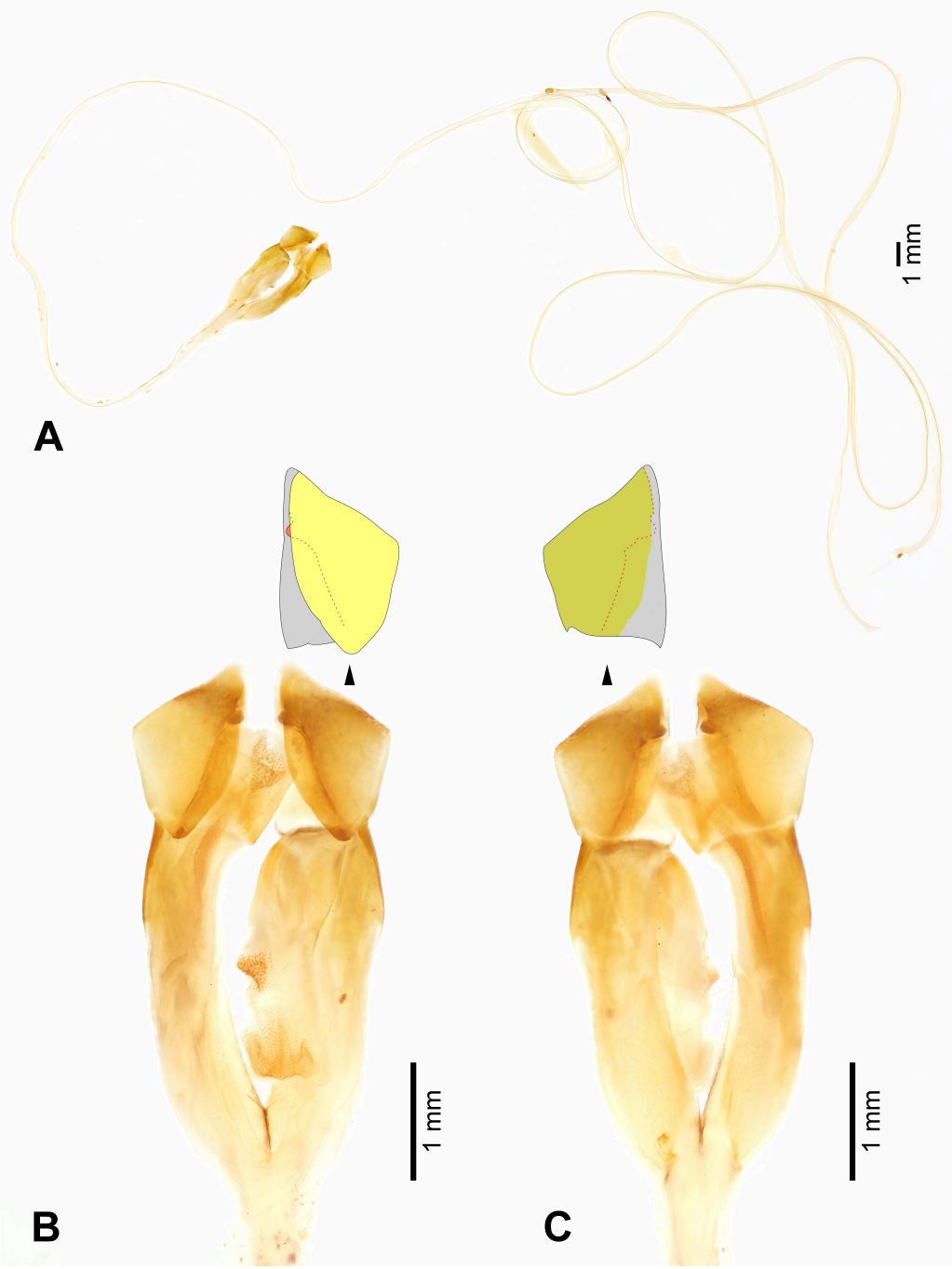

FIGURE 4. *Mongolabis qixiashana* **sp. nov.**, male holotype: **A** genitalia, general view **B** genitalia in detail, dorsal view **C** genitalia in detail, ventral view. Dorsal membrane indicated by yellow; ventral membrane indicated by grey; inner groove and the process indicated by red line.

Diagnosis. The new species can be readily distinguished from all other congeners, as well as from species of *Anisolabella*, *Euborellia*, and *Gonolabis*, by the presence of a distinct subapical lobe located in the groove between the dorsal and ventral membranes of each external paramere (Steinmann 1989; Srivastava 1990, 1999; Kočárek 2014; Nishikawa 2021). A similar process is also present in another genus of Anisolabididae, *Aborolabis* Srivastava, 1969. However, in *Aborolabis*, the process is formed solely by the ventral membrane rather than the groove between both membranes (Srivastava 1969; Steinmann 1979, 1989). The deeply notched male penultimate sternite further distinguishes the new species, representing a rare condition among related genera.

Distribution. CHINA: Jiangsu Province: Nanjing City.

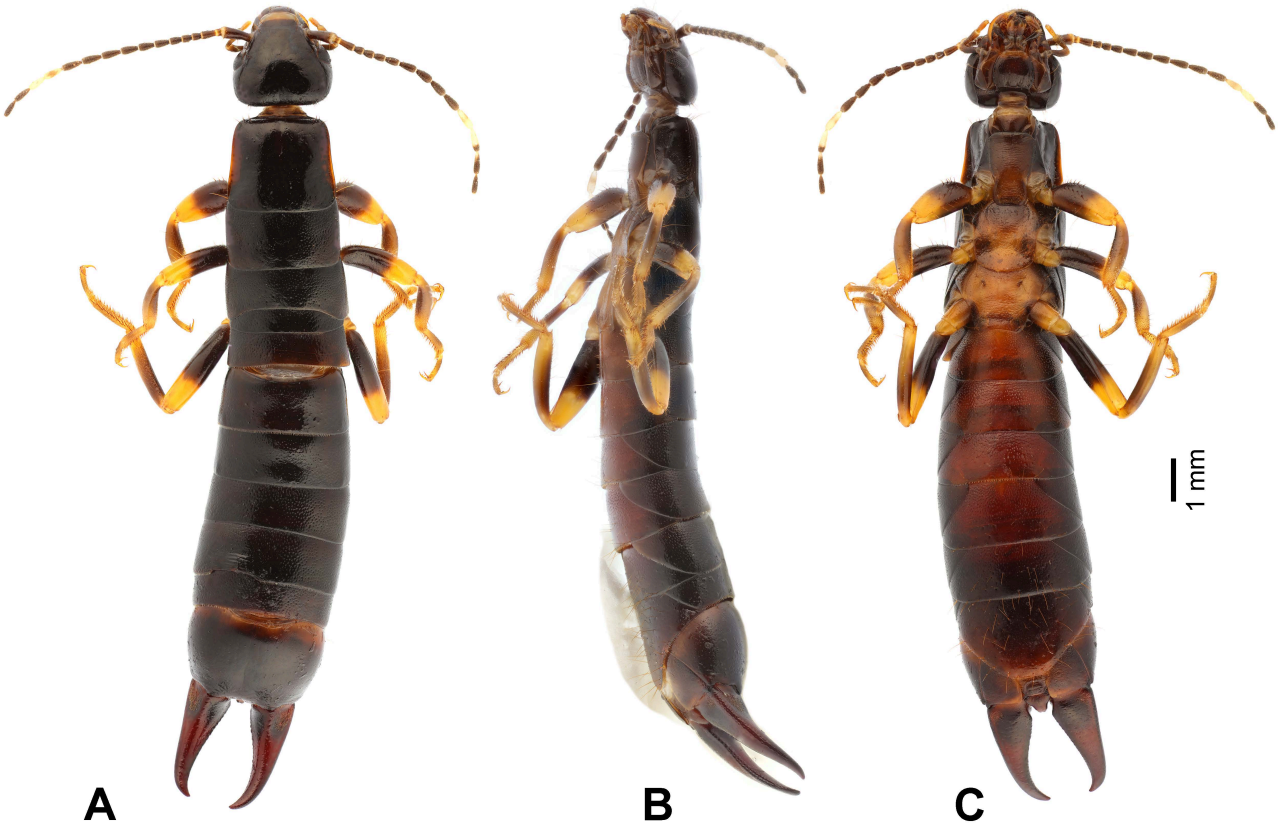

FIGURE 5. *Mongolabis qixiashana* **sp. nov.**, female paratype: **A** habitus, dorsal view **B** habitus, lateral view **C** habitus, ventral view.

Acknowledgements

The author thanks the editor and reviewers for their insightful and constructive comments.

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Additional information

Author contributions: Resources, Visualization, Writing–original draft, Writing–review and editing: Z-T Chen.

Conflict of interest: The author has declared that no competing interests exist.

Data availability: All of the data that support the findings of this study are available in the main text.

Ethical statement: No ethical statement was reported.

Funding: This study was self-funded by the authors.

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